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Journal of the Society of Arts.

FRIDAY, AUGUST 23, 1867.

Announcements by the Council.

ARTIZANS' VISIT TO PARIS.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date:—

H.R.H. THE PRINCE OF WALES, President ..	£31	10	0
HER MAJESTY'S GOVERNMENT (conditional) ..	500	0	0
Society of Arts ..	105	0	0
Earl Granville, K.G. ..	5	0	0
Lord de L'Isle ..	10	0	0
Thomas Twining ..	2	2	0
Sir J. P. Boileau, Bart. ..	5	0	0
George Godwin, F.R.S. ..	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S. ..	10	0	0
Sir W. H. Bodkin (Assistant-Judge) ..	3	3	0
Sir Rowland Hill, K.C.B. ..	3	3	0
Benjamin Shaw ..	2	2	0
Alfred Davis ..	10	10	0
Eugène Rimmel ..	5	5	0
Frederick Mocatta ..	2	2	0
James Marshall ..	2	2	0
Robert Dawbarn ..	1	0	0
Henry Vaughan ..	10	10	0
Philip Sancton ..	5	0	0
Somerset A. Beaumont ..	5	0	0
Decimus Burton, F.R.S. ..	1	0	0
W. Botly ..	1	1	0
Professor Robert Bentley ..	2	2	0
John Stuart Mill, M.P. ..	1	1	0
G. F. Wilson, F.R.S. ..	2	2	0
Henry Creed ..	1	1	0
The Marquis of Salisbury, K.G. ..	10	0	0
D. Robertson Blaine ..	2	2	0
William Hawes ..	2	2	0
Seymour Teulon ..	1	1	0
G. N. Hooper ..	2	2	0
Lord Taunton ..	5	0	0
Henry Cole, C.B. ..	1	0	0
A. Robb ..	1	1	0
S. Andrews ..	1	1	0
Thomas Dixon ..	1	1	0
Charles Telford ..	1	1	0
Edmund Burke ..	2	0	0
W. H. Gore Langton, M.P. ..	5	0	0
J. R. Fowler ..	1	0	0
John Rutson ..	1	1	0
W. Fothergill Cooke ..	2	2	0
J. P. Gassiot, F.R.S. ..	5	5	0
The Duke of Devonshire ..	10	0	0
Messrs. Chawner and Co. ..	2	2	0
Chas. Brooke, F.R.S. ..	1	1	0
T. Chappell ..	2	2	0
C. Candy ..	2	0	0
Alfred Haines ..	2	2	0
Major-General Sir William Gordon, K.C.B. ..	2	2	0
Bartlett Hooper ..	2	2	0

Carry forward£795 7 0

Brought forward	£795	7	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B. ..	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0
William Browne	1	1	0
T. Kibble	1	1	0
C. Garland	1	1	0
Antonio Brady	2	2	0

Collected in response to a Circular issued by the
Birmingham Chamber of Commerce.

G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the <i>Birmingham Journal</i> and <i>Daily Post</i>	2	2	0
The Proprietors of the <i>Birmingham Gazette</i>	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham	2	2	0
Messrs. Hinks and Wells, Birmingham	2	2	0
Messrs. Van Wart and Co., Birmingham	5	0	0

Carry forward£952 15 0

Brought forward	£952	15	0
Messrs. Evans and Askin, Birmingham ..	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham	1	1	0
Messrs. Chance and Co., Birmingham ..	5	5	0
*Messrs. Ashford and Winder, Birmingham	10	0	0
*William Aston, Birmingham	10	0	0
*Messrs. Chance and Co., Birmingham (2nd donation)	5	5	0
*Messrs. Griffiths and Browett, Birmingham (2nd donation)	5	5	0
*Messrs. Peyton and Co., Birmingham (2nd donation)	2	2	0
Messrs. Gammon and Co., Birmingham ..	2	2	0
Messrs. Messengers and Co., Birmingham ..	5	5	0
Total	£1,003	4	0

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen. A certain number have already been selected, and some of them are now in Paris.

Proceedings of the Society.

SOCIETY'S VISIT TO PARIS.

In making the arrangements for the members visiting Paris, it was considered that it would add materially to their convenience if they had the option of acting independently or of joining in parties to visit this or that establishment. On former occasions considerable difficulty was found in planning concerted arrangements, so as to suit the time and engagements of a number of persons. On the present occasion it was therefore determined to leave matters as far as possible in the hands of members themselves, who, with their cards of membership, could visit, singly or in parties, the various establishments whose proprietors or directors had courteously acceded to the request made by the Council of the Society for facilities of inspection. Nearly two hundred members took out their cards of membership; and very interesting visits, sometimes singly and sometimes in parties, were paid to various manufacturing establishments and other objects of interest in the French capital.

A party one morning paid a visit to the great Horticultural establishment in the Bois de Boulogne, belonging to the municipality of Paris, to whose care the public places and gardens of the city are entrusted. In this establishment are reared, at the public charge, the various plants and shrubs with which the city is so profusely adorned.

Through the kindness of the Prefect, permission was given for a small party of the members to pay a visit to the sewers. The party was received at the Place du Chatélet, and on descending a spiral iron staircase they found awaiting them some small, low carriages, travelling on rails laid on each side of the channel in which the sewage runs at the bottom of the great subterranean tunnel. The tunnel is well lighted, and the carriages had each four moderator lamps attached to them. These carriages, as soon as the party were seated, were pushed along by men who ran

on each side. Over head were seen the large iron tubes for the conveyance of the water supply, one set of tubes carrying the drinking water, and the other that for general purposes, it being found necessary to have the two services in order to economise that of the best quality. At the top of the tunnel were seen the various wires for the telegraph service of the city. The sewer is well ventilated; and, notwithstanding the journey was performed over the surface of the sewage, there was but little disagreeable odour.

The tunnel, or large collecting sewer, passes from the Place du Chatelet, beneath the whole length of the Rue de Rivoli, as far as the Rue Royale, when it follows the course of that street. At the commencement of the Rue Royale the party were transferred to a barge, which conveyed them along the line of that street, and they emerged into the open air by the Madeleine, by a spiral staircase, similar to that by which they had descended.

To the carriages, as well as the barges, are attached arrangements which act, when required, as temporary dams or sluices, by means of which the flushing of the sewers is effected.

The gas service is not conducted through this tunnel, the authorities fearing accumulations of gas might take place, in the event of leakages, and explosions occur. Looking at the construction of this tunnel, and the manner in which the lateral connexions are formed, it is obviously just possible, in spite of the excellent ventilation, that an accumulation might take place at the crown of the sewer, and the precaution is no doubt a wise one. In Nottingham, where the gas mains are laid in the subways; they are so constructed that the escape always takes place at the highest point, and hence no accumulation of gas can take place.

The sewage is conducted to the outfall into the Seine at Asnières. Although at no great distance from Paris in the straight line, it is many miles distant following the windings of the river. It is understood that attempts to utilise the sewage have not hitherto been attended with much success.

A large party on a subsequent day visited the Catacombs.

A party also visited the new reservoirs for the water-supply of Paris, at Menilmontant, and were much interested in these splendid monuments of engineering skill.

A visit was also paid to the workmen's houses in the Avenue Daumesnil, now being constructed for the Emperor of the French, by Messrs. Newton and Shephard. They are built of concrete, on Mr. Shephard's system, as described by Mr. Newton in the Society's *Journal*, p. 317. The party were conducted over the buildings by Mr. Newton, junior, who explained very fully the method of these constructions.

The efforts which are now being made to provide economical houses and lodgings in Paris, and which are warmly supported and encouraged by the Emperor, offer valuable opportunities of study. The experiment now being made by order of the Emperor is of considerable extent; forty houses are about to be erected on the model of one already completed in the Avenue Daumesnil. Each house comprises three sets of apartments on different floors, and each apartment three rooms, including a kitchen, with a cellar. In the rear of the houses will be a garden, or promenade, common to all the inmates of the forty houses. This colony is intended for a co-operative association of working men, and is but the prelude to far more extensive operations. Near Bercy the experiment is being tried in another form; two hundred houses, constructed in like manner, and of which twelve are now in progress, are to be erected, each for a single family, having three rooms, besides the kitchen and cellar, and standing each in its own garden. The rent of each of these houses is fixed at 75 centimes, little more than 7d. per day, and at the end of ten years, it becomes the absolute property of the tenant. The intention is said

to be to erect twelve thousand houses of this class in various parts of the outskirts of the city.

A party also visited a large house, now in course of construction in the Rue de Naples, Boulevard Mals-herbes, building on the system of bétons agglomérés—a special description of concrete—by M. Francois Coignet. The party were shown over the building, and its mode of construction was explained to them by the director of the establishment. The question of building in concrete is now attracting much attention, and the system seems worthy of the consideration of our architects and engineers. The Coignet system has now been in operation for about ten years in Paris, and large public works, churches, sewers, and barracks, have been satisfactorily executed. The subterranean galleries of the Exhibition are all built upon this system. In the building over which the party went, they were shown a well staircase, serving six stories, which was in fact one piece of artificial stone; indeed, the house itself, from bottom to top, is in reality one vast monolith.

Proceedings of Institutions.

CHORLEY MECHANICS' INSTITUTION.—The tenth annual report congratulates the members on the continued prosperity of the Institution. The number of members for the past year has been—Honorary, 34; newsroom, 94; ordinary, 85: as compared with—Honorary, 37; newsroom, 87; and ordinary, 97; in the preceding year. The ordinary attendance at the night school during the past year has been about 35. An examination in connexion with the Lancashire and Cheshire Union of Institutes was held, when seven candidates were presented for examination, of whom three succeeded in obtaining certificates, and to whom local prizes have been awarded. The number of volumes taken out of the library during the year has been 800, as compared with 791 in the previous year. There have been ten penny readings during the winter months, which have been so far successful as to realise a profit of £5 17s. 6d. The accounts show that the expenditure has been £113 15s. 6½d., and that there was a deficit of £8 9s. 7½d.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(Continued from page 612.)

DOMESTIC ECONOMY.

THREE HOURS ALLOWED.

SECTION I.

1. Describe the best method of remedying the evil of smoky chimneys, and the causes which produce it.
2. Mention some of the bad effects of defective draining in human dwellings, and by what means, not very expensive, you might improve the ventilation of a close room.
3. Give clear directions to a young cook as to the faults to be guarded against in common culinary operations.
4. Give directions for roasting meat.
5. Give a receipt for Irish stew.
6. Give a receipt for cheap soups.
7. Give a receipt for making and boiling a plum pudding.
8. Give instances of waste of food, and directions how to use articles commonly wasted.
9. State the most important circumstance to be attended to in a poultry house.
10. What varieties of fowls are to be recommended for eggs only, for market fowls, and for general purposes?
11. Explain what is meant by hard water, and how the hardness of water may be reduced.

12. For what uses is hard water objectionable, and for what unobjectionable?

13. What is the composition of soap? Explain its action in cleansing articles by washing, and the precautions that ought to be observed in purchasing and keeping it.

14. What ought to be the yearly cost of clothing a girl between 14 and 16 years of age, the daughter of a mechanic, or of a day labourer? Support your opinion by a detailed estimate.

15. If a mistress saves one-fourth of an income of £100 during five years, and invests that sum, and the interest accruing therefrom, regularly in a savings bank at 2½ per cent., what sum will she have at the end of the time?

16. Explain what is meant by "deferred annuities," and the advantage of them.

17. Write out a table of troy weight and of avoirdupois weight, and state the purposes for which these weights are respectively used.

18. Write out tables of cloth measure and of measures of capacity.

SECTION II.

1. Write an essay on the duties of a maid of all-work.
2. Write a letter of advice to a girl about to take the place of kitchen-maid or nurse-maid.

POLITICAL AND SOCIAL ECONOMY.

THREE HOURS ALLOWED.

Questions from Stephens's Commentaries.

1. Under what circumstances is a master not bound by, or liable for, what his servant does, though it may be done in the course of or in relation to the service?

2. How far and for what purposes, and under what circumstances, has an infant the power of binding himself by contract?

3. In what way were Acts of Parliament prepared and drawn up before the time of Henry the Fifth; what alteration was made in his reign; and what is the form of enacting words now in use?

4. What is the meaning of going into committee upon a bill in the House of Commons, and what is the mode of proceeding therein?

5. What is the present position of Jews in England, in regard to their civil and political rights; and has any change in regard to them been made since the year 1853?

6. What are the provisions of the Royal Marriage Act; and when was it passed?

7. Can an army be lawfully maintained without the consent of Parliament? In what way is that consent given; and what are the Articles of War; and by whose authority are they made?

8. When and in what way were justices of the peace substituted for conservators of the peace; in what way are they appointed; and what is the meaning of the expression, "one of the quorum?"

Questions from Professor Fawcett's Manual for those who aspire to a First-class Certificate.

1. What are the elements of which profits consist; and what are the causes which determine their average rate?

2. What are the economical disadvantages and advantages (if any) of slave-labour?

3. What is the connection between the rate of profit and the rent of land?

4. In what way can the increased demand for a manufactured article diminish its price?

5. Under what circumstances and by what means can trades' unions affect the rate of wages?

6. What is the total amount of gold which has been produced from Australia and California, and what effect has it had upon prices?

7. State the argument for subjecting professional incomes and those arising from permanent property to the same rate of income-tax.

GEOGRAPHY.

THREE HOURS ALLOWED.

1. Enumerate, in geographical succession, the principal rivers upon the east and west coasts of Great Britain respectively: distinguish those amongst them which have the largest areas of drainage, and name the principal tributaries of these latter.
2. Describe (with reference to outline, surface, drainage, mineral produce, and chief towns), or, if you prefer it, draw a map of, any one county either of Great Britain or Ireland.
3. Give a brief account of the principal mountain systems of the European continent; also of the principal lowland plains.
4. Describe briefly either one of the following countries:—France, Spain, Italy; with reference to outline, features of surface, river-basins, climate, produce, and chief towns.
5. Make a list of the countries of Asia, naming the capital, and (in the cases of maritime countries) the chief seaports, of each.
6. Write a brief account of the rivers Yang-tze, Ganges, Euphrates, and Obi—as to course, outlet, comparative area of basin, and chief tributaries.
7. Enumerate the various Australian colonies, with their principal towns: also say in what the natural resources of each mainly consist.
8. Draw a map either of New Zealand or of any one of the Australian colonies: if of New Zealand, mark on it the different provinces.
9. Give a brief account of Canada and the adjacent provinces of New Brunswick and Nova Scotia—as to extent, surface, climate, productions, and towns.
10. In what parts of the world are the trade winds experienced? In what region do monsoons occur? What is the characteristic difference between the two? How are these winds respectively accounted for?
11. How is the geographical distribution of plants affected by latitude? Mention some of the characteristic food plants proper to the Old and New Worlds respectively.
12. Amongst the *carnivora*, what characteristic differences are met with in comparing the animals native to the Old and New Worlds respectively? What orders (in the list of *mammalia*) are wanting in the zoology of Australia? To what order do the native mammals of Australia almost exclusively belong?

ENGLISH HISTORY.

THREE HOURS ALLOWED.

GENERAL QUESTIONS.

1. Give the dates of the following events:—The invasion of this country by Julius Cæsar; the supposed landing of Hengist and Horsa; the consolidation of the Heptarchy; the accession of Alfred the Great; the appointment of Dunstan to the see of Canterbury; the accession of Canute, and of Edward the Confessor; the commencement of the several dynasties which have occupied the throne of England from the time of the Conquest to the present day.
2. Mention the most eminent sovereigns of the several dynasties, and state the reasons for your selection.
3. In what reigns did the following events take place:—The conquest of Ireland; the conquest of Wales; the battles of Cressy and of Agincourt; the grant of Magna Charta; the establishment of the House of Commons; the union of the Roses; the Reformation; the Great Rebellion; the union of England and Scotland, of Great Britain and Ireland; the capture and defence of Gibraltar; the siege of Fort St. David by Duplex; the battle of Plassey; the declaration of American Independence; the reformation of the Calendar.
4. By whom was Christianity introduced into this country? in what part of it, and why? What form did it assume? By what class of men was it disseminated? What material evidences of this work remain at the present time? Explain such words as minster, minister,

abbey church, the priory, Grey Friars and Blackfriars, Eleanor Cross, cathedral, cloister.

5. Explain what is meant by Papal and Royal Supremacy; by what sovereign was the former abrogated in this kingdom, and on what grounds?
6. Explain briefly the main provisions of the four great charters of English liberties; and mention the periods at which they were enacted.
7. What was the purport of the first Act of Settlement, and what of the second?
8. What is meant by the expression, "The British Constitution?"
9. In what persons is the legislative and executive power vested in these kingdoms? in whom the administration of justice? and state what precautions have been adopted from time to time to secure its impartiality.
10. What are the special prerogatives of the three estates of this realm?
11. Between what parties, with what results, and at what time, were fought the battles of Hastings, Tinchebrai, Damme, Sluys, Mortimer's Cross, Bosworth, Flodden, Naseby, Quiberon Bay, Nile, and Trafalgar?
12. Refer the following names, events, &c., to their proper periods in English history:—
(a.) Wicliffe, Chaucer, Sir Thomas More, Spenser, Lord Bacon, Ben Jonson, Dryden, Pope, Newton, Locke, Addison, Hume, Gibbon, Dr. Johnson, Wordsworth.
(b.) Introduction of printing, poor laws, Sunday schools, steamboats, power loom, gas, railways, newspapers.

SPECIAL.

1. Divide the reign of Charles I. into three parts—1625-1629, 1629-1640, 1640-1649; state briefly the main events in the three divisions, and name the chief leaders on both sides.
2. What were the chief points in debate between Charles and his parliament in the first and second of these periods?
3. Draw a brief parallel between the life and principles of any two leaders of the parties which were opposed to one another.

(To be continued.)

TECHNICAL EDUCATION.

(Continued from page 614.)

14. From J. Scott Russell, Esq., F.R.S.

5, Westminster-chambers, S.W.,
June 24, 1867.

SIR,—I have the honour to acknowledge the receipt of your letter of the 31st ult., enclosing copy of a letter addressed to the Chairman of the Schools Inquiry Commission by Dr. Lyon Playfair, and inquiring whether I agree with the substance of that letter.

In reply, I have to state that in much that Dr. Playfair has said I entirely agree, and that from my own recent personal inquiries into the state of technical education in Switzerland, Germany, and France I have reluctantly come to the conclusion that it is much more advanced in those countries than in ours.

As a Juror in the Paris Exhibition I have come to the conclusion that the higher class of education given in each of those countries to the workmen in its skilled trades, as well as the superior professional education given to the higher classes of men employed in technical professions, is everywhere visible in the works exhibited by those countries. And I attribute the surprising strides those countries have been making for the last ten years in many of the great staple branches of mechanical construction and manufacture to the admirable scientific and practical training which the governments of those countries provide for their working classes.

I enclose a memorandum, which at the request of some other jurors I prepared in Paris last month, as an expression both of my own opinion and that of many others with whom I have conversed on this subject. I may say

that we had felt it our duty in some way to call the attention of Government and the public to this matter, when Dr. Lyon Playfair's letter appeared in the *Times*.

So convinced was I of the importance of technical education to this country, that before the opening of the present Exhibition in Paris I took the opportunity of an invitation which had been given me to assist a meeting of the Society of Arts in the Technical Museum attached to the University of Edinburgh, to address the meeting on this subject, and I enclose also a newspaper report of that address.

I have, &c.,

J. SCOTT RUSSELL.

Henry J. Roby, Esq., M.A., &c., &c.

15. (*Enclosed in Mr. Scott Russell's Letter of the 24th June, 1867.*)

MEMORANDUM.

The fourth great International Exhibition has afforded an excellent opportunity for marking the relative progress of different countries in the arts, manufactures, and trades which contribute to the wealth and power of nations. We have especially noted the progress of other nations in those mechanical and constructive arts and trades in which, in 1851, England exhibited pre-eminent excellence. We have to record that in many of these some other nations appear to have made much more rapid progress than ourselves, so that we are *relatively* falling off. And we especially note that our falling off is not in unimportant departments, but in some of those which had formerly constituted our staple excellence.

We have to specify that those branches, in which other countries have now shown more rapid advancement, are some of our own great manufactures of steel and iron, steam machinery, locomotive engines, and tools and manufacturing machinery in general. We do not say that in all of these other nations have excelled us, in some they have not yet equalled us. But what we do feel, and therefore frankly state is, that their progress has, in the last 16 years since the first Exhibition of 1851, been remarkably greater than ours.

There are other branches of arts and manufactures in which possibly the reverse is the case. Glass and pottery, and the arts of design and construction of beautiful patterns both in form and colour, have made remarkable progress throughout England during the same period; we therefore confine our present remarks to the mechanical and constructive arts, not commonly called fine arts.

Dissatisfied with our national progress, we have naturally turned our minds to search for the cause of the progress of other nations and for the cure of our own deficiency. We find that during these years some nations have been occupied in diligently promoting the national education of the various classes of skilled mechanical workmen, for the purpose of giving skill to the unskilled and rendering the skilled more skilful. We find that some nations have gone so far as to have established in every considerable town technical schools for the purpose of teaching all the youths intended to be craftsmen those branches of science which relate most nearly to the principles of their future craft. Workers in metal are taught the nature of the mechanical powers with which they will have to work, and the chemical properties of the materials they will have to operate upon; engine builders are taught the principles of heat and steam, and the nature of the engines they have to make and work; shipbuilders are taught the laws of construction, hydraulics, and hydrostatics; and dyers and painters are taught the laws of chemistry and colour. All skilled youth are taught geometry, drawing, and calculation; and in many countries every youth who shows great talent in any department is promoted to a higher training school, and there educated at the public cost.

Besides these local schools, other countries have technical colleges of a very high class for the education of

masters and foremen in engineering, mechanics, merchandise, and other practical and technical professions.

We have not failed to notice that it is precisely those nations which have been systematically giving a course of preparatory training and education to their population in their skilled trades that have shown the most marked progress in national industry in these successive exhibitions.

Prussia, Switzerland, Belgium, France, America seem to make progress in proportion to their excellence of educational training:—Prussia in steel, iron, and general engineering work; Switzerland in scientific engineering, machinery, and watch and telegraph work, and in textile manufactures; Belgium in metal working and mechanical trades; France in metal work, and in steam engines, engineering structures, naval architecture, and steam navigation. All these nations seem to exhibit growing skill and progress in proportion to the excellence of the education and training they give to their manufacturing population.

It becomes therefore a serious national question for England and the English, whether they have or have not been wise in neglecting to take adequate measures of a national character for the complete technical training of all the youth destined to skilled trades and occupations. By this training we do not on the one hand mean elementary education, nor on the other hand do we mean any substitute for a practical working apprenticeship. We mean a schooling midway between the elementary day school and the workshop, which the youth should enter after he knows reading, writing, and counting, in order to learn to apply his reading, writing, and calculation to the purpose of acquiring such knowledge of mathematics, mechanics, mineralogy, chemistry, drawing, &c., as shall fit him more aptly and perfectly afterwards to learn and to profit by the teaching of the workshop and the office. It is unquestionable that apprentices to trades, coming into the workshops with this preparation, will make greatly more rapid and certain progress than those who enter direct from the elementary school.

But in England we can scarcely as yet be said to possess such schools. Certainly they are not uniformly distributed over the towns of England; and it seems that in no country have they thriven or even existed except when organized and sustained by nations at large, acting through their governments.

We have therefore to recommend to the serious attention of the British nation the consideration of the importance of establishing a national system of technical and trade education.

J. SCOTT RUSSELL.

Paris, May, 1867.

16. *From E. W. Cooke, Esq., R.A., F.R.S.*

The Ferns, Hyde-park-gate, South Kensington,
June 23, 1867.

MY LORD,—Having read with very great interest Dr. Lyon Playfair's admirable letter to your Lordship, I beg to state, though with considerable regret, that I am compelled to agree entirely with the opinions and conclusions expressed in that letter.

During a very careful and impartial examination of the varied productions of European countries in the International Exhibition at Paris, a multitude of instances met my eye which impressed me with the decided superiority of the industrial productions of the Continent over those of our own country. It must be distinctly understood, however, that I refer only to works of artistic taste—not to fine art—in matters connected with objects of useful and ornamental character belonging to the peaceful arts. With matters of war, whether military or naval, or the multitudinous inventions and triumphs in machinery, I have nothing to say, having no experience in those departments; nor have I any knowledge of the numerous economic manufactures, removed in a great measure from such as are the

result of fine taste and æsthetic feelings. In these latter objects it is that I feel the truth and justness of Dr. Playfair's broad and honest opinions. In very numerous instances I could not but observe the great advance made in the design as well as execution of works during the last ten years, in which I had sanguinely hoped we in England would have greatly excelled, if not triumphed, over our Continental neighbours. In this I am sorry to confess I have been disappointed, and am of opinion that it behoves the Executive Government and the chief municipal bodies of our country to lose not a moment in the consideration of this most important subject, in which the trade and commerce, the prosperity of our working men, and, I may say, our *national honour*, are so vitally and so deeply concerned and interested.

I cannot at present enter into details, but your Lordship will perceive that I entirely concur in every word of Dr. Playfair's letter.

I have, &c., E. W. COOKE, R.A., F.R.S.
To the Right Hon. Lord Taunton, &c., &c.

17. *From Wm. Spotten, Esq.*

Belfast, June 29, 1867.

SIR,—In reply to your letter of 27th instant, I beg to state that I agree with the substance of the inclosed letter.* I am &c.,

WM. SPOTTEN.

To H. J. Roby, Esq.,
&c., &c.

18. *From A. J. Mundella, Esq.*

Nottingham, June 29, 1867.

MY LORDS AND GENTLEMEN,—In reply to the inquiry addressed to me through your secretary, I have the honour to state that in the main I agree with Dr. Playfair's letter of the 15th ultimo, but I am of opinion that art and industrial education, without a thoroughly organized system of primary instruction, will not remove the danger which threatens our manufacturing and commercial supremacy.

I trust it will not be deemed presumptuous if I lay briefly before you the result of my observation on a subject in which I have long been interested.

The branch of industry with which I have been connected for thirty years past is the manufacture of hosiery. I am the managing partner of a firm employing five thousand (5,000) workpeople, with establishments in Nottingham, Derby, and Loughborough, employing more than four-fifths of the number, and with branches at Chemnitz and Pausa, in Saxony, employing about seven hundred persons.

In addition to the opportunities and experience which the superintendence of these establishments has afforded me, I have for many years past formed friendships with manufacturers in France and Germany. I have had free access to their warehouses and workshops, and I am as well acquainted with the progress of my own branch of industry in those countries as in England.

As the result of my observation I have for four or five years past been increasingly alarmed for our industrial supremacy; and my experience of the Paris Exhibition has only confirmed and strengthened my fears. In my own branch we still maintain the lead in the majority of articles, but the progress made by France and Germany since 1862 is truly astonishing, and it has been much greater than our own.

I am of opinion that Englishmen possess more energy, enterprise, and inventiveness than any other European nation. The best machines in my trade now at work in France and Germany are the inventions of Englishmen, and in most cases of uneducated workmen; but these machines of English invention are constructed and improved by men who have had the advantage of a superior industrial education. The largest hosiery ma-

chine-shop in France is that of Monsieur Tailbours, at St. Just; models of all the best English machines have been purchased and imported, and are there improved and constructed on thoroughly scientific principles, under the superintendence of a young man who, I was informed, took high honours at the school of the Government in Paris.

Precisely the same thing is taking place in Saxony, but the Saxons are, in respect of education, both primary and industrial, much in advance of the French, and in my branch they are our most formidable rivals.

In Nottingham, where the best machinery in the world is required and used in the production of hosiery and lace, there is no such thing as industrial education, and, greatly as it is to be desired, I am acquainted with many good mechanics and superior workmen to whom it would be of no service, inasmuch as they can neither read nor write.

The contrast betwixt the workpeople of England and Saxony, engaged in the same industry, is most humiliating. I have had statistics taken of various workshops and rooms in factories in this district, and the frightful ignorance they reveal is disheartening and appalling. I was born and educated amongst the working classes, and all my life have been in close association with them, but I never realised the condition of the *lower masses* of our workpeople till I took the pains to examine them personally in the manner I have indicated.

In Saxony, our manager, an Englishman of superior intelligence, and greatly interested in education, during a residence of seven years has never yet met with a workman who cannot read or write. And not in the limited and imperfect manner in which the majority of English artisans are said to read and write, but with a freedom and familiarity that enables them to enjoy reading and to conduct their correspondence in a creditable and often superior style. Some of the sons of our poorest workmen in Saxony are receiving a technical education at the Polytechnic schools, such as the sons of our manufacturers cannot hope to obtain.

Whilst, therefore, I believe that the English workman is possessed of greater natural capacity than any of his foreign competitors, I am of opinion that he is gradually losing the race through the superior intelligence which foreign governments are carefully developing in their artisans.

The influence of strikes and lock-outs has been undoubtedly against industrial progress. But the worst practices of trades unions are the result of the gross ignorance of the majority of workmen who are connected with them. I succeeded, nearly seven years ago, in forming a board of arbitration and conciliation for the hosiery trade of this district, and no strike has taken place since its formation. Leicester has recently followed our example, and during the past week the lace trade has done the same. This is the only solution, in my opinion, of that difficulty.

The education of Germany is the result of a national organization, which compels every parent to send his children to school, and, after having laid the foundation of a sound education, affords to all those who have the capacity and inclination the opportunity of acquiring such technical knowledge as may be useful in the department of industry for which they are destined.

If we are to maintain our position in the industrial competition, we must oppose to this national organization one equally effective and complete. If we continue the fight with our present voluntary system, we shall be defeated. Generations hence we shall be struggling with ignorance, squalor, pauperism, and crime; but with a system of national education made compulsory, and supplemented with art and industrial education, I believe within twenty years England would possess the most intelligent and inventive artisans in the world.

My Lords and Gentlemen,

Yours, &c.,

A. J. MUNDELLA.

Her Majesty's Schools Inquiry Commissioners.

[* The enclosed letter was Dr. Lyon Playfair's.]

19. *From James Young, Esq.*

Chemical Works, Bathgate, July 4, 1867.

SIR,—I had the honour to receive your letter of 20th June, requesting me to give you my experience as to whether I agree in substance with Dr. Lyon Playfair's letter to Lord Taunton. I was a juror in the English Exhibition of 1862, but in the French Exhibition I am only an exhibitor; as such I have spent about a month in Paris studying the Exhibition, and there had the opportunity of meeting many jurors of different nations. I am bound to say that my experience accords with that of Dr. Lyon Playfair. So formidable did the rate of progress of other nations appear to many of us, that several meetings of jurors, exhibitors, and others took place at the Louvre Hotel on the subject. The universal impression at these meetings was that the rate of progress of foreign nations in the larger number of our staple industries was much better than our own. But it must be stated that a large number of our first-class machine and other manufacturers are not exhibitors in Paris, whereas other nations, I believe, have taken care to bring forward their very best; still, the great progress of other countries is evident. The reason for this increased rate of progress is the excellent system of technical education given to the masters of workshops, sub-managers, foremen, and even workmen.

England for a long time excelled all other countries in the finish of her machines; but now we find that foreign machine makers are rapidly approaching us in finish, and, having skilled and intelligent labour cheaper than ourselves, are progressing in all the elements of manufacturing.

Permit me to use my own case as an illustration. Originally I was a working man, but have succeeded in increasing the range of manufacturing industry. The foundation of my success consisted in my having been fortunately attached to the laboratory of the Andersonian University in Glasgow, when I learned chemistry under Graham, and natural philosophy and other subjects under the respective professors. This knowledge gave me the power of improving the chemical manufactures into which I afterwards passed as a servant, and ultimately led to my being the founder of a new branch of industry, and owner of the largest chemical manufacturing works of the kingdom. It would be most ungrateful of me if I did not recognise the importance of scientific and technical education in improving and advancing manufactures. Many men, without such education, have made inventions and improvements, but they have struggled against enormous difficulties, which only a powerful genius could overcome, and they have been sensible of the obstacles to their progress. Stephenson, who so greatly improved locomotives, had to be his own instructor, but he sent his son Robert to Edinburgh University, and the son did works at least as great as the father, and with far less difficulty to himself.

The improvement in locomotion has necessarily created great competition in the industries of the world, and unless we add skilled instruction to manual labour, England cannot expect to maintain her position in the industrial race. I have &c., JAMES YOUNG.

H. J. Roby, Esq., &c., &c.

THE PRUD'HOMMES SYSTEM.

HISTORICAL SKETCH.

The following is an historical sketch of the prud'homme system in France. The original idea of this institution dates back, in France, to a very early period. In those times the word prud'homme (*homoprudens*) was employed to designate judges, experts, and municipal officers. In the year 1296, in the reign of Philip le Bel, the Council of the City of Paris determined to appoint twenty-four prud'hommes, whose duty should be to accompany the chief of the merchants and the municipal councillors in their visits to the masters.

In 1414, the citizens of Lyons were authorised to nominate a prud'homme, to put an end to the disputes between the merchants and manufacturers attending the fairs. Later, an institution, called the "Tribunal Commun," was established at Lyons, and its duty was to settle amicably disputes between the silk manufacturers and their workmen.

After the abolition of trade guilds, in 1791, it was found necessary, in order to counteract the abuses which arose from an unrestricted liberty in trade and commerce, to lay down rules for the regulation of all matters arising between manufacturers and their workmen. With this object in view a law was passed in the year XI., which, after authorising the establishment of deliberative chambers of manufactures and trade, punishes with fine and imprisonment every combination, either on the part of masters for the purpose of lowering wages, or on the part of workmen to strike, or prevent others from working, or to stop work in any workshop. This law enacts that all police-court matters between workmen and apprentices and manufacturers shall be taken before the Prefect of Police in Paris, before the commissary-general in such towns as possess such an officer, and before the mayor or deputy-mayor in other places. This, however, not being satisfactory, in 1806 a further step was taken, and the Council of Prud'hommes was established. Whilst, however, the law only established this at Lyons, the Government by a decree formed Councils of Prud'hommes in other manufacturing towns. These arrangements remained in force until 1848. Complaints were made that workmen were not admitted to the Council of Prud'hommes, and that there was an unjust preponderance in favour of the manufacturers. In 1848, therefore, the Council of Prud'hommes was re-organised on an entirely new basis. The electors are declared to be manufacturers (patrons), masters of workshops (*chefs d'atelier*), foremen (*contre-maitres*), 21 years of age, and resident for six months within the district; whilst the same parties are eligible to serve on the council provided they are 25 years of age, have a knowledge of reading and writing, and have been domiciled for a year within the district. In 1853, a considerable modification was made in the arrangements. The Prud'hommes are not judges in the true acceptation of the term. They have special functions, of an exceptional character, of the same nature as those of Councilors of the Prefecture. Their powers are not executive, but simply administrative, and they are not exempt as judges from serving on juries. They hold their situations by election, except the president and vice-president, who are appointed by the Emperor. The Prud'hommes differ from civil or commercial judges, inasmuch as they have no executive power, and the same oath of office which they take before the prefect is not the oath of investiture which the members of Tribunals of Commerce take before the Imperial Court. There seems, however, to be some difference on this head, and the precise position which the prud'hommes hold as compared with judges proper seems not quite ascertained. In some of their proceedings they are treated as judges, whilst in others they are not. These, however, are nice points for discussion among French lawyers, but are not of any practical interest to the English reader.

HOW THE COUNCIL IS FORMED.

A Council of Prud'hommes is established on a resolution, passed by a Chamber of Commerce, or Deliberative Chamber of manufacturers, requesting the establishment of such a body. This request is communicated to the Prefect, who transmits it to the Minister of Agriculture and Commerce, with the following documents:—1. The vote of the Municipal Council undertaking to pay the expense; 2. A table showing all the industries amenable to the Council proposed to be established, such industries being placed under their proper divisions, the number of prud'hommes to be elected in each of them, and the

number of masters and workmen, whether electors or not, included in each division. A decree is then issued, in conformity with the regulations of Government, after the application has been passed, by the Council of State. This decree also fixes the number of which the Council is to consist, which must be six at least, exclusive of the president and vice-president, who, as has before been stated, are named by the Emperor.

The members forming the Council of Prud'hommes are elected by masters (patrons),* small masters (chefs d'atelier), foremen (contre-maitres), workmen connected with the trades comprised in the decree.

The qualifications for electors are as follows:—Masters ("patrons") must be of the age of 25 years, must have been licensed for five years at least, and for three years within the district of the Council. The smaller masters ("chefs-d'ateliers"), foremen ("contre-maitres") and workmen, must be of 25 years of age, and have exercised their craft for five years at least, and have been resident in the district for three years.

Persons eligible to serve on the Council must have the same qualifications as an elector, but in addition they must be 30 years of age, and able to read and write. Foreigners can neither elect nor be elected.

The list of electors is settled by the mayor of the district, and lodged with the prefect, who summons the electors to meet; the two classes of electors, masters and workmen, meeting separately, and separately electing representatives of their own class. There is an equal number of Prud'hommes in each class. In addition to public notices of the election, each elector has sent him a special notice. The mayor, or deputy-mayor, presides at these elections. The President and Vice-president hold their office for three years; and one-half of the Council retires every three years. Vacancies by death or legal incapacity are filled up by election, and the party elected to fill a vacancy holds office for the remainder of the period his predecessor would have done.

The prefect administers to each Prud'homme the oath of office, *i.e.*, of obedience to the law, allegiance to the Emperor, and for faithful discharge of his duties.

The Council of Prud'hommes is divided into two chambers, one termed the private chamber (a chamber of arbitration or reconciliation), and the other the general or judicial chamber.

The Chamber of arbitration is composed of one prud'homme manufacturer and one prud'homme of the working class. This chamber must sit once a week at least for the settlement of disputes, and is presided over by the president or vice-president.

The General Chamber is composed of an equal number of master and workman prud'hommes, besides the president and vice-president, and this number must not be less than two of each class, whatever the number of the whole council may be.† The General Chamber must meet twice a month at least, to decide judicially on cases which have not been settled by arbitration. There is a paid secretary attached to each council.

THE DUTIES AND POWERS OF THE COUNCIL OF PRUD'HOMMES AS REGARDS BOTH CIVIL AND CRIMINAL PROCEEDINGS.

Firstly, what persons are amenable to them.

Secondly, what disputes come under the jurisdiction of the Council.

Councils of Prud'hommes are competent to decide in all cases of dispute between manufacturers, small masters, foremen, journeymen, and apprentices, whatever be the amount in dispute; but their jurisdiction

does not include other persons than those named above, and thus wholesale or retail dealers, not being manufacturers, do not come within the jurisdiction, nor do the clerks or agents who sell the goods or keep the books, nor the proprietor who lets his manufactory, if he does not carry on the business either by himself or by some one on his behalf. As regards the workmen, no distinction is drawn between the workman in a factory or one who works to order in his own house. All that is necessary is that he should be under the actual control or order of some manufacturer; but to this there are some exceptions by the courts of law. Thus the artist who furnishes designs for the manufacturer cannot be brought before the Council of Prud'hommes, for he is not under the orders or control of the manufacturer.

The Council can only take cognizance of disputes relating to the trades in which the parties are engaged, or the arrangements connected therewith. All other disputes, as well as matters relating to trades not named in the decree establishing the Council, are excluded.

Disputes relating to apprenticeship matters, discharge of workmen, &c., are within the jurisdiction of the Council. The Council have power to settle the damages or restitutions which shall be made between parties on the cancelling of a contract, and to determine the indemnity to be paid by a master or workman convicted of having decoyed an apprentice from his master's house. When, however, a third party, as is frequently the case in apprenticeship matters, is concerned, such as the parent or guardian, the Council has no power to interfere. An agreement between a master and his clerk to teach the clerk the business, is not an apprenticeship matter, and does not come under the jurisdiction of the Council.

As a general rule, the place where the defendant dwells determines the tribunal before which the complaint is brought; but, as regards the Council of Prud'hommes, it appears that this rule does not hold, and the jurisdiction of the Council extends over all manufacturers and workmen engaged in the manufactures of the district covered by the decree establishing the Council, notwithstanding the parties may happen to dwell beyond the limits. By the special words of the decree establishing the Council of Prud'hommes at Dijon, this regulation is laid down, and it may be taken as a rule that the situation of the factory, and not the domicile of the party, determines the tribunal. The district over which the jurisdiction extends is laid down in the decree, thus in Lyons it is declared to be the three cantons into which the city is divided. By consent, however, of both parties, the Council may proceed in cases out of their jurisdiction. Councils of Prud'hommes have no power in cases between two manufacturers; the object of their establishment is to settle disputes between them and their subordinates. The Councils cannot take cognizance of a question of warranty against a third party, neither master nor workman. Such a claim must come before the regular tribunals. In cases where the matter not within their jurisdiction affects public rights the Council declines to proceed, but if it is purely of a private character the Council, in the absence of objection by the parties, goes on with the proceedings. The main object of the Prud'hommes Councils is to reconcile the parties, and, in default of reconciliation, to pronounce judgment on the matters in dispute.

THE CHAMBER OF ARBITRATION OR RECONCILIATION.

The great object for which these Councils have been established is, by means of arbitration, to settle the small differences which are daily taking place between manufacturers and workmen, and everything coming within the powers of the Councils is submitted to their arbitration. The Chamber of arbitration is specially established for this portion of the business, and is composed, as has been said before, of a prud'homme master and a prud'homme workman, with the president. The parties must appear in person on the day and hour named in the letter sent by the secretary. The appear-

* "Patrons" are defined as those who manufacture their own materials; "chefs-d'ateliers" as those who, with or without the aid of journeymen and apprentices, carry on their work in their own homes, and make up the materials supplied by others, and according to patterns and directions given them. The editor is, however, informed by a Prud'homme that there is no distinction between the chef d'atelier and the contremaitre, and that both are properly translated "foreman."

† The "Patrons" form one class, the "chefs d'atelier," "contremaitres," and "ouvriers" form the other class.

ance of the parties in person is absolutely imperative, except in case of sickness, and then a party may be represented by a relative merchant or manufacturer, duly authorised by letter. Parties may be assisted by counsel. If the person requested to attend by the secretary does not appear, a citation, naming day and hour of attendance, with a short statement of the complaint, is placed in the hands of the bailiff to serve on the defendant. The parties are required to state their case carefully in plain and simple language, and if they offend in this particular, after being called to order by the president, they may be fined to an amount not exceeding 10 francs, and notice of such fine is affixed in some public place in the town or district. When the chamber of reconciliation does not succeed in reconciling the parties, the case is sent at once to the general chamber for legal judgment. Minors and married women, under certain circumstances, are amenable to the chamber, but, as these proceedings depend on points of French law, which differs so entirely from English law, it is needless to enter upon them here. The award made by the chamber has not the force of a judgment, but is binding on the parties as a private contract, and has to be enforced as such contracts by the regular tribunals. Either party may put the other to his oath, and, this, if taken, is conclusive, but, if refused, the Council, not acting as judges, have no power to condemn, but simply insert the fact of refusal in their proceedings. The law declares that no action shall be brought before the courts unless there has been a previous proceeding before the Council of Prud'hommes.

OF THE GENERAL CHAMBER, OR CHAMBER OF JUDGMENT.

The General Chamber takes cognizance of all cases in which the attempt at reconciliation has failed. Its judgment is without appeal in all cases where the claim does not exceed 200 fr. (£8), but beyond that sum an appeal lies to the Tribunal of Commerce. The parties are brought before the chamber by citation, preceded by a letter from the secretary. Minors and married women can sue and be sued before this chamber (according to the special law of France relating to parties in these conditions). The defence must be made in three days after notice served by the bailiff, and the defendant puts in a statement in writing of the particulars of his defence, and sets down the case for hearing for the first day of the Council's sitting. The time for putting in the defence may be enlarged. In case of non-attendance judgment may be given by default. The appeal, if any, must be made within three months. Immediate execution may be obtained, and in cases of appeal the Council may in their discretion order provisional execution in the way of security for the payment of the amount, and this only a personal security if the parties be solvent. The Council being what is termed an exceptional court, has no power of executing its judgments, but it has the power of interpreting its decisions, a power which belongs to all tribunals without exception. The Council of Prud'hommes have power to pronounce judgment against the person in certain cases, thus in matters of commerce it has this power when the debt exceeds 200 frs., or when the damages and interest exceed 300 frs.

POWERS OF PRUD'HOMMES IN MATTERS OF POLICE.

The jurisdiction is confined in the same way as its civil jurisdiction. It deals only with matters occurring to disturb the order and discipline of the workshop; all other disturbances go before the ordinary police tribunals. Insubordination, bad language, blows, &c., come under the meaning of disturbing the order and discipline of the factory. In all cases under their jurisdiction the Prud'hommes appear to have the same powers as police magistrates, and their decisions are subject to the same right of appeal.

OTHER DUTIES OF PRUD'HOMMES.

They are invested with the duty of protecting property in design and trade-marks, settlement of accounts between manufacturers and managers or foremen; inspection

of workshops; the reporting infringements of the laws. The deposit of designs is made in the office of the secretary of the Council, and specially registered. In cases of dispute as to the right to a design, the Council issues a certificate stating which of the manufacturers has made the first deposit. The duties of the Prud'hommes go no further than this. The question is tried before the Tribunal of Commerce. Formerly the Council had jurisdiction in matters of trade marks, but this is no longer the case, such matters being now under the jurisdiction of the Tribunal of Commerce.

The Prud'hommes have jurisdiction in settling accounts between merchants and those entrusted with the making up of materials entrusted to them, and these accounts, when the balance is struck, are registered with the Prud'hommes, and a copy is delivered to the employer and the employed. When the balance-sheet shows a balance due from the employed to the merchant this balance is paid by means of monies kept back by the next employer, and this is compulsory on him, and he must retain in his hands for this purpose one-eighth part of the price of the work done. The new employer is liable to pay the accounts, up to 500 frs., when the employed has left the former employer without his consent or legal cause.*

The Prud'hommes, in deciding between masters and workmen, may take into consideration the custom of the trade when the agreements between the parties are silent.

The Prud'hommes are charged with the inspection of workshops; and this duty consists in collecting important statistics of the trade, numbers of workmen employed, &c., the improvements of which the manufacture is susceptible, its fallings off, the means of overcoming their shortcomings, in short, everything in which the public interest and industrial progress is concerned. The Prud'hommes are bound to give the manufacturers two days' previous notice of their coming, but they have no power to call for the books of the trade, nor for information as to new processes which it is required to keep secret.

The Prud'hommes are judges in matters of infraction of laws and rules of trade. Managers as well as workmen are not permitted to divulge trade secrets, and are punishable by the Prud'hommes if they do so. The like applies to breaches of trust and theft. The Prud'hommes draw up a *proces-verbal*, and this is acted upon at once by the other tribunals, who award punishments accordingly. Combinations among workmen come under their jurisdiction, but combinations, by the law of 1864, are now permitted so long as the means employed are not in themselves illegal. Whoever by violence, threats, or illegal means endeavours to create a strike, either among masters or men, with the view of raising or lowering wages, or interferes with the freedom of labour, is liable to an imprisonment of from six days to twelve months, and a fine of from 16 fr. to 3,000 fr. Prud'hommes neglecting their duties may be dismissed.

PARIS EXHIBITION.

The English and American departments, and, to a less extent, the German also, have been in a state of great excitement about a trial which has taken place to ascertain the relative value of two iron safes exhibited, one by Mr. Herring, of New York, the other by Mr. Chatwood, or rather the Chatwood Company, of Bolton-le-Moors. Mr. Herring challenged all the world to a trial of safes, and Mr. Chatwood accepted the challenge, the stake being £600 on each side, the balance of the loser's stake, after deducting costs of the trial, to be divided between certain charities of Paris, London, and Washington, to be named by the winner. A committee of five engineers was appointed to watch over the operations and pronounce upon the results. Two gentlemen, Robert Mallet, Esq., C.E., F.R.S., and Robert F. Fairlie, Esq.,

* The object of this law is to prevent masters from deceiving men from their places.

C.E., both of London, were nominated by Mr. Chatwood, and J. E. Holmes, Esq., C.E. and J. R. Pickering, Esq., C.E., both of New York, by Mr. Herring; these four gentlemen then elected a French engineer, M. Paul Douliot, of the firm of Cail and Co., of Paris, as their president, and nominated Mr. W. J. Hazle, of the Whitworth Company, to act as secretary.

The conditions, as they appear in the printed copy of the terms of agreement, were, that each party might make use of gunpowder, picklocks, drills, taps, cold chisels, or any other tools or implements used by burglars, but the terms of this agreement were not maintained. Each party, by consent, employed three men to open the other's safe; Mr. Herring sent to New York for two noted locksmiths, and obtained the volunteer aid of the foreman of a German safe-maker; Mr. Chatwood selected two of his own men, and his number was completed by a Manchester man, also a volunteer. As soon as the terms of the trial were agreed upon the two safes were delivered into the charge of the committee, who examined them in order to see that no improper alteration or arrangement had been made in them since the challenge was given. They were then placed in the English testing-house for the trial. The next point was the production of the tools which each party was to use against his opponent's safe, and here the conditions of the agreement seem to have been entirely broken through. Mr. Chatwood's men carried theirs in a bag with a block-tin hammer (made use of by burglars) in a gun-case, so that they might have been carried into any house without creating the least suspicion; Mr. Herring's men appeared with two large cases of tools, which had to be brought to the testing-house on a truck, and included a sledge hammer, with a head weighing about 20 lbs.; immense steel wedges, weighing nearly, if not quite, as much; a powerful screw frame, such as is used to punch holes in rails and to straighten them, weighing about two cwt.; a drilling frame, large enough to embrace the safe; and lever and crowbars five feet long, if not more; in all a mass of engineers' tools weighing between four and five cwt. The committee rejected the screw frame and some other large wedges, but the sledge hammer, crows, and drilling frame were allowed.

The question as to the relative value of the safes was not put in a satisfactory manner, and the conditions of the two were totally different, so that the committee will certainly have some difficulty in arriving at a satisfactory conclusion.

Mr. Herring's safe was about five feet high, but contained within it a small box of immense strength fixed to the bottom of the safe near the back. Mr. Chatwood's safe is about three feet high, without any inner box; both have double skins, the hollow being filled in with fire-proof composition.

The portion of the trial which touches the security of property against burglars is the one which interests the world, and though circumstances already referred to make the task very difficult, we shall try to separate, as far as possible, one phase of the trial from the other. And here it may be mentioned that as regards the time occupied in the various operations, it was taken for the committee by Mr. Walker, of London, whose own safe was forced by burglars some months ago, and who, chronometer in hand, watched the proceedings with natural interest.

The work began on the 13th instant, at 2.44 p.m. In 29 minutes the doors of Mr. Herring's safe were forced by means of small wedges, and flung wide open, and the whole of the drawers and shelves thrown out upon the floor, leaving nothing inside but the small box at the bottom already alluded to. During this same time, and up to 3.45, that is to say for one hour one minute, Mr. Herring's men had tried picks, the drilling frame with ratchet brace, taps, wedges, and punches or drifts with the sledge hammer, on the lock and door of Mr. Chatwood's safe, and were then compelled to give the task up as hopeless; the peculiar form of the closing edges preventing the introduction of the wedges, the brittle

spiegeleisen enclosed between the double wrought iron sides of the safe breaking the drills, and causing them to fly about the testing house in the most dangerous manner, while the general strength of the safe resisted even the drift and sledge hammer. Had not the latter been used, the operations upon Mr. Chatwood's safe, save and except the noise made, were such as three burglars might have effected; but the door remained intact in spite of all, as did the small enclosed box in Mr. Herring's.

Foiled in their attempts in front, Mr. Herring's men began to operate on the side of Mr. Chatwood's safe with the immense steel wedges, crowbars, and sledge-hammers already alluded to, using, in addition, a large boiler-maker's set, that is to say, a strong steel cutting punch, with handle, struck by the sledge hammer, and they succeeded in making an entry; when this work commenced Mr. Chatwood claimed the sledge hammer also, which was of course immediately allowed, and his men set to work upon the solid door of the inclosed box at 7.26 o'clock. At 7.40 Chatwood's men had made a hole in the front of Herring's small box, and greatly shaken it, but the men were evidently fatigued; the light was nearly gone, so the work was stopped for the night. On the following morning the destruction of Herring's enclosed safe was completed in four minutes and a-half.

The recital of the latter portion of the experiments is only useful as exhibiting the admirable workmanship which the men had to destroy. We have already described the tools used; the men who wielded them were first-class workmen and foremen, some of them of Herculean strength, and the noise was so terrific that the public, unaware of what was going on in the testing house, were positively dismayed, and the police had some difficulty in maintaining order without; this will not surprise anyone when we state that the sledge-hammers were brought down upon the heads of sets and wedges five, six, and seven times in succession, without a halt, with a force and precision that astonished even engineers present. It should be added that the whole of the operations were watched by the members of the committee, some officers of the executive, a few members of the English press, and Mr. Walker the time keeper.

Fine Arts.

ARTISTS' EXHIBITION.—There exist at Fontainebleau itself, and also in several villages in the forest, colonies of artists, of which Barbizon and Marlotte are the principal, and an inn in the former village has long been famous for the sketches left by artists on the walls of its various chambers. A notice has just appeared, to the effect that the artists have now established an exhibition of their own works in the same village, which is open gratuitously to the public from May till December.

Manufactures.

A LOOM FOR WEAVING CONVEX WORK has been invented in New York, and is now being shown at the Paris Exhibition. Besides answering the purpose of the hand-loom, hitherto exclusively used, it possesses the advantage—which is absolutely necessary where labour is scarce—of doing ten times the amount of work in the same space of time. With the hand-loom, one man can make at the utmost four pair of stays a day; whereas the convex weaving machine turns out 40 pairs daily; they are, besides, more flexible than the hand-loom stays, and quite free from hard seams. This loom does the work automatically; the principle of a constant length of travel for the shuttle was adopted for the sake of simplicity; but but as it is necessary, in weaving the gores, that the weft thread should pass through only a part of the breadth of the warp, the jacquard has

been employed for the purpose of taking up the portion of the warp required to be woven in that part. As the shuttle passes over the full breadth of the warp, of which only one portion, say one-third, is to be used, it unwinds the full length of weft thread from the bobbin, but only one-third of it is tied in the warp. In repassing the shuttle one-third more is tied, thus leaving one-third of the unemployed weft thread in the form of a loop upon the article manufactured. To remove this superfluous thread, the thread-catcher, which is a lever with an elastic finger, passes from behind, through the lay on each side of the reed, and pulls the thread out. In consequence of this partial opening of the warp, the fly shuttle could not be used, and another contrivance had to be resorted to. This consists in a carrier, by which the shuttle is conveyed to the centre of the warp, where it is taken by the other carrier and passed through the warp. By these carriers a very even motion, free from all jerks, is imparted to the shuttle. The most difficult part of the work is performed by the regulator, or take-up motion, the action of which is to take up the woven cloth in such a manner as to leave a straight line in front of the reed. The material is woven first only on one side, then for the cases left for the whalebones, where the material must be double, evenly over the whole breadth, then on the other side only; and, finally, for the full breadth at the back and front of the stay, the motion must change accordingly. To effect this, the cloth passes between two sets of rollers, the upper of which are simple pressure rollers, to be regulated by springs and set-screws. The lower rollers are fluted, and worked by a system of levers independent of each other. The levers are worked conjointly by the jacquard, and lie so that the lay gives only a movement to those levers which have been previously acted upon by the jacquard. A very elastic warp tension is obtained by a peculiarly-constructed lever, combined with an elastic break, so as to render the machine fit for any work, flat or convex, plain or ornamented, according to the cards placed upon the jacquard and the material put in warp and shuttle.

Notes.

HONOURS TO MEN OF SCIENCE, &c., IN FRANCE.—Amongst the decorations bestowed on the occasion of the Imperial fêtes, we find the following:—M. Barreswil, chemist, elevated to the rank of Officer of the Legion of Honour; and the following manufacturers created Chevaliers of the same order:—MM. Bouillon, iron master; Brun-Faulqueir, stearine candle manufacturer, Montpellier; Gabriel Depaynin, director of coal mines; Durand, spinner, Flairac; Hayem, manufacturer, Paris; Husson, waterproof cloth maker, Paris; Joubert, sail-cloth maker, Angers; Charles Leroy, manufacturer, Gentilly; Eugene Laniel, manufacturer, Vimontiers; Gustave Lemaitre, manufacturer, Bolbec; Isidore Leroy, paper hanging manufacturer, Paris; Méry-Samson, manufacturer, Lisleux; Testenoire, silk manufacturer, Lyons; Aubert, manufacturer, Elbeuf; Vivaux, iron master, Dammarié; Lévy, director of mines, Moselle; Doré, iron master, Mans; Durand, iron master, Dordogne.

INDUSTRIAL PRIZES.—The Society of Industrial Sciences of Lyons offers silver and bronze medals for memoirs on the following subjects, for the year 1868:—*Mechanics*—1. The most efficacious means of obtaining industrial furnaces, by a good disposition of all the parts, well arranged ventilation, economic combustion of fuel, and relative smoke-consuming power; 2. The means for controlling, measuring, and registering the motive power of machines, with the view of regulating the interests of proprietors and hirers of motive power. *Chemistry*—1. Introduction of a new chemical industry with the department of the Rhone; 2. Creation of a chemical process or improvement of one already known.

Silk Trades—1. Construction of an improved power loom for weaving plain silks; 2. Application of a known motor of not more than two horse power nominal, and presenting the greatest simplicity and economy of installation, regularity, and economy in working, and other qualities necessary for its introduction into the weaving shops of Lyons. *Natural Sciences*—1. The best geological chart of one or more cantons of the Rhone; 2. Discovery, in the environs of Lyons, of a mineral substance applicable to the casting of metals, and especially of bronze, brass, &c.; 3. Explanation of the cause of the malady which attacks the silkworm, and means of prevention. *Commerce and Trade in General*—1. Introduction, with success, of a new industry in Lyons; 2. Project for the foundation of a superior school of commerce at Lyons.

PUBLIC CHARITY IN PARIS.—The Direction of Public Charity has just taken a census of the poor population of Paris, which gives the following results:—In 1863 the total of the indigent population of Paris was given officially at 40,056 families, comprising 101,570 individuals; last year the total had increased to 40,644 families and 105,119 individuals, the proportion being one person inscribed on the lists of relief for every 17·12 inhabitants; this includes only those whose names appear in the lists of the *bureaux de bienfaisance*, and who are in receipt of official relief. The richest *arrondissement*, that of the Elysée, has but one indigent person out of 53·65; the poorest, that of the quarter of the Observatory, one in 9·25; and that of Menilmontant, one in 12·60. It is stated that three-fourths of the indigent poor are not Parisians, but provincials, attracted to the capital by the increase in wages, without taking into account the corresponding increase in rent and the cost of living. The whole sum distributed is excessively small, amounting on an average only to 48f. 65c. per annum for each family, or 18f. 65c. to each individual relieved.

AGRICULTURAL PRIZES IN FRANCE.—The Paris Society for the Encouragement of Arts and Manufactures has just announced a series of new prizes in favour of agriculture. (1.) A prize of 6,000 francs, to be awarded in 1873, for steam cultivation. (2.) A prize of 3,000 francs, for 1872, for the invention and propagation of the best methods of reducing the cost of hand-labour in the getting in of cereals. (3.) A prize of 3,000 francs, session 1874, for the cultivation of land on the slopes of mountains. (4.) Two prizes of 3,000 and 2,000 francs for systems of irrigation, to be awarded in 1874. (5.) A prize of 2,000 francs, to be awarded in 1870, for the best account of the various processes of wine making in use in the different parts of France, their discussion and comparison, and the improvements of which they are susceptible. (6.) A prize of 3,000 francs, to be awarded in 1869, for the best apparatus or process, in practical use, for the preservation of wine, with a view to exportation as well as the home trade. (7.) A prize of 1,000 francs, to be given in 1871, for the best study of the agriculture and rural economy of a province or department. The Society of Agriculture of Clermont in the Oise, distributes its prizes in September, for long service and good conduct of agricultural labourers; for the good construction and manufacture of agricultural implements—machines, and tools; and to the most able workmen in the management, care, and repair of agricultural implements, including steam engines. This prize has been established on the proposition of M. Albaret, who says: "It often happens that an agricultural machine is received from a distant part of the country (from abroad perhaps) which will not work, but which an intelligent artisan would set to rights in a short time, and at very small cost; such a prize would assist in stimulating rural workmen, blacksmiths, farriers, and others, to study such machines, and enable them to repair them when accidents happened, and thus save the neighbourhood considerable loss in time as well as money." The establishment of such a prize is equally honorable to the proposer and

the society which has adopted the proposition, and offers an excellent example for imitation.

FOOT BRIDGES OVER CROWDED STREETS.—It has long been proposed to throw foot bridges over the most crowded boulevards of Paris, and a plan for effecting this is now under the consideration of the authorities. The author of it proposes, by way of experiment, to erect a double foot bridge near the Boulevard Montmartre, where it is intersected by the Rue Montmartre and the Faubourg of the same name. The plan of the proposed bridge is nearly in the form of the letter X, that is to say, four flights of steps are to lead from the four corners of the footpaths to a central platform; each flight, however, is divided below into two branches, which being semi-circular, allow of a considerable elevation without overhanging the roadway. At the top of this compound staircase is a landing place, which is connected with the main platform by means of another short flight of steps. The proposed height of the platform above the road is about twenty-one feet. Executed in cast and wrought iron the estimate for this foot bridge is 50,000 francs (£2,000.)

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

- Delivered on 13th August, 1867.*
- Par. Numb.
520. Metropolis Gas Bill—Special Report from the Select Committee.
- Delivered on 14th August, 1867.*
270. Bill—County General Assessment (Scotland) (amended).
279. „ Railway Companies Relief.
312. „ Poor Law Board, &c. (Lords' Amendments.)
313. „ Royal Military Canal.
487. Caledonian Canal—Sixty-second Report of the Commissioners.
- Delivered on 15th August, 1867.*
308. Bill—Militia (England).
314. „ Guarantee of Government Officers (Lords' Amendments).
315. „ Dogs Regulation (Ireland) Act (1865) Amendment (Lords' Amendments).
316. „ Canongate Annuity Tax (Edinburgh) (Lords' Amendments).
333. Public Accounts—First Report and Evidence.
431. (A. N.) Poor Rates and Pauperism—Return (A) (June, 1866 and 1867).
498. Sasinos (Scotland)—Return.
529. New Parishes and Church Building Acts, &c.—Returns.
535. Roach River Oyster Fishery—Mr. Pennell's Report.

SESSION 1866.

422. (C. I.) Poor Rates and Pauperism—Return (C).
- Delivered on 16th August, 1867.*
303. Bill—Metropolitan Municipal Government.
317. „ Banns of Matrimony (Lords' Amendments).
425. Special and Common Juries—Report and Evidence.
548. Western Australia—Extracts of Correspondence.
Public General Acts—Cap. 70 to 99.
- Delivered on 17th August, 1867.*
318. Bill—Increase of the Episcopate (Lords' Reasons).
524. Inland Revenue—Return.
525. Constabulary (Ireland)—Nominal List.
Public Petitions—Thirty-seventh Report.

- Delivered on 19th August, 1867.*
399. East London Water Bills, &c.—Report and Evidence.
407. Finance Accounts (1866-67), Parts I. to VII.
506. Gaols—Return.
Public General Acts—Cap. 100 to 104.

Patents.

From Commissioners of Patents' Journal, August 16th.

GRANTS OF PROVISIONAL PROTECTION.

- Aërial apparatus—2229—J. E. Nelson.
Artificial fuel—2065—H. Fletcher.
Barley, drying—2095—J. Schofield and J. C. Dawson.
Bottles, securing contents of—1899—P. Smith.
Boxes for holding pieces of paper for use—2215—J. C. C. Azémar.
Brakes for cotton lappers or seutchers—2242—J. G. Tongue.
Capsules—2151—W. Betts.
Carding engines—2209—B. Dobson and W. Slater.
Cartridge pouches—2098—G. H. Daw.
Cast-iron, treating—2282—E. T. Horsley.
Coffee injectors—2250—J. F. and F. Penton.
Compost, fertilizing—2198—A. Watt.
Condensers, self-acting—2077—J. Brière.
Electric light, production of the—2221—F. H. Holmes.

- Fibrous substances, preparing—2219—F. A. Calvert.
Fire-arms—2216—C. E. Brooman.
Fire-arms—2228—W. Tranter.
Fire escapes, &c.—2069—J. Scott.
Food, preserving substances for—2238—J. Dewar.
Forge hammers—2240—W. Horton.
Furnaces—2264—J. Heaton.
Furnaces—2266—J. Lockwood.
Furnaces—2268—J. Bolland.
Gas from petroleum, &c.—2194—D. Hodge and R. C. Witty.
Hose, &c.—2224—J. Quin.
India-rubber thread cutting—2280—M. Hamer.
Kitchen ranges—2274—M. Jones.
Lamps—2199—J. B. A. Menage.
Lamps—2256—J. Angus.
Looms—2201—W. Gadd.
Looms—2211—M. J. Fearnley and C. Smith.
Malt liquors, raising to a higher level than that of the vessel in which they are kept—2081—J. Fleming.
Metallic ores, &c., grinding and pulverizing—1939—T. Borlase.
Miners' lamps—1908—C. C. Dubrulle.
Miners' safety-lamps—2230—S. Higgs.
Motive-power of water, steam, &c.—2278—F. C. Marshall and H. Stewart.
Needle cases and wrappers—2206—A. James.
Needle cases, &c.—2225—R. Newhall.
Petroleum, &c., burning—2196—B. F. Stevens.
Photographic apparatus—2170—C. Silvy.
Ploughs—2210—M. Puddefoot.
Printing consecutive numbers—2084—J. Fraser.
Projectiles—2190—A. M. Clark.
Rollers used in doubling cotton, &c.—2202—J. Haworth & E. Hamer.
Rollers, &c., with india-rubber surfaces—2232—J. Poole.
Rollers, &c., preparing moulds for the casting of—2286—C. Benson and J. Barker.
Rotary pumps—2246—R. Bewley.
Safety-box slides—1804—H. G. B. Röber.
Saws, &c., straightening and flattening—2248—J. Russell.
Seeds, &c., sorting, screening, and classifying—2272—H. H. Murdoch.
Ships, propelling and steering—2205—C. Mayo.
Ships, &c., composition for coating—2012—R. Smith.
Smoke, &c., condensing noxious—2212—J. M. Hocking.
Soda from chloride of sodium, &c., producing—2121—J. Hargreaves.
Spinning and doubling machines—2208—B. Dobson and J. Cocker.
Spinning and doubling machines—2244—J. and T. Elce.
Steam engines—2284—G. Holcroft and W. N. Dack.
Steam generators and condensers—2097—J. Slater.
Stoves, hot-blast—2182—H. Chamberlain.
Sugar, manufacturing—2213—G. Gordon.
Umbrellas—2220—J. H. Johnson.
Vessels and aerial conveyances by reaction, propelling—2223—R. B. Boyman.
Vessels, propelling, and pumping water—2254—W. W. Hughes.
Waten cases, &c.—2252—J. T. Hatfield.

INVENTION WITH COMPLETE SPECIFICATION FILED.

- Blowers for furnaces, &c.—2324—B. F. Sturtevant.

PATENTS SEALED.

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| 445. G. F. Redfern. | 511. J. Marshall. |
| 446. A. A. Fousset. | 515. W. Barrett. |
| 450. E. Brasier. | 523. E. Funnell. |
| 451. E. Brasier. | 535. A. Howat. |
| 458. J. H. Johnson. | 580. F. A. P. Van deputte. |
| 466. M. Henry. | 608. H. Ulliel. |
| 467. W. S. Gamble. | 622. G. H. Morgan. |
| 471. H. Wadkin & C. Shepherd. | 642. W. E. Newton. |
| 473. J. Robinson and J. Smith. | 656. J. H. Johnson. |
| 484. J. Harrison. | 866. W. Clark. |
| 487. W. W. Urquhart and J. Lindsay. | 1288. J. F. Collins. |
| 498. H. Purnell. | 1766. J. E. Boyce and R. Harrington. |

From Commissioners of Patents' Journal, August 20th.

PATENTS SEALED.

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| 236. W. Dickinson. | 529. J. Tatham. |
| 474. J. Weems & T. Robertson. | 538. J. Saxby and J. S. Farmer. |
| 477. W. Riddell. | 542. T. B. Kay and F. Hamilton. |
| 483. M. Walker, G. H. Money, and F. Little. | 558. A. McCallum. |
| 486. C. Colwell. | 559. A. B. Brown. |
| 488. A. I. L. Gordon. | 574. J. H. Johnson. |
| 495. W. E. Heath. | 575. T. Berrens. |
| 499. A. Kinder & W. B. Kinsey. | 704. H. L. Corlett. |
| 500. W. Deakin & J. B. Johnson. | 1110. J. Richardson & C. Greenwood. |
| 507. J. Bates. | 1186. L. B. Bruen. |
| 509. C. E. Brooman. | 1227. J. Swinburne. |
| 510. G. Lüttringhaus. | 1269. E. B. Bigelow. |
| 516. J. Allison. | 1826. A. M. Clark. |
| 524. E. Hely. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

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| 2019. W. Richardson. | 2061. F. G. Underhay and R. Heyworth. |
| 2031. R. A. Brooman. | |
| 2044. W. Datziel. | 2183. W. Clark. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

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| 1968. E. Wroughton & T. Holmes. | 2047. W. Thomson & F. Jenkin. |
| 2016. M. Jacoby. | 2068. J. Bingley. |